

REMARKS

Claims 22-42 are pending in this application. For purposes of expedition, claims 22-28, 30-33 and 35-41 have been amended in several particulars for purposes of clarity and brevity that are unrelated to patentability and prior art rejections, in accordance with current Office policy, to define Applicants' disclosed invention and to assist the Examiner to expedite compact prosecution of the instant application.

As a preliminary matter, Applicants note that the Office Action (an unnumbered paper) dated on April 24, 2003 is nothing more than a *verbatim* copy of the Office Action (Paper No. 3) dated on October 29, 2002. Whereas the Office Action (Paper No. 3) dated on October 29, 2002 evidently makes reference to some phantom claims 1-42 that were not existed in the instant application, the present Office Action (an unnumbered paper) dated on April 24, 2003, at least correctly makes reference to claims 22-42 as now pending in the application. However, both the Office Actions are equally incomplete and fail to comply with the requirements under 37 C.F.R. §1.104 and MPEP §707. Piecemeal examination as mandated by MPEP §707(g) "should be avoided as much as possible ... Where a major technical rejection is proper, it should be stated with a full development of reasons rather than a mere conclusion coupled with some stereotyped expression." An omnibus rejection of the claim "on the references and for reasons of record" is stereotyped and not information and should therefore be avoided. Rather, under MPEP §707(d), where a claim is refused for any reason relating to the merits thereof it should be "rejected" and the ground of rejection fully and clearly stated, and the word "reject" must be used. If the claim is rejected is rejected as being indefinite, the Examine

should point out wherein the indefiniteness resides; or if rejected as incomplete, the element or elements lacking should be specified.

Unfortunately, in the present situation, the Examiner has **not** demonstrated as to why the disclosure is "vague, convoluted or incomplete" and, likewise, why claims 22-42 as now pending in the application are "vague, incomplete or merely expressions or desired results" as alleged on page 3 of the Office Action (an unnumbered paper) dated on April 24, 2003. Equally puzzling is the Examiner's attempt to reject Applicants' claims 22-42 under 35 U.S.C. §102 and 35 U.S.C. §103. On page 4 of the Office Action (an unnumbered paper) dated on April 24, 2003, the Examiner simply states that,

"Claims 22-42 are subject tp [sic] the same rejections as set forth previously. As part of applicant's disclosure requirement it is necessary to point out the invention in view of the prior art which in this instance is the art cited and applied in detail in the PCT to claims of essentially the same subject matter and scope of 22-42. Also the independent claims appear to be drawn to different inventions, to be responsive, each independent claims must be argued as to unity of invention and the novel/unobvious language in view of Sauverwein (which has a five page US equivalent) and the other IDS references pointed out."

This statement does **not** constitute a rejection of Applicants' claims 22-42 as mandated by 37 C.F.R. §1.104 and MPEP §707. The burden of establishing a basis for denying patentability of Applicants' claims 22-42 rests upon the Examiner, and **not** with the Applicants. Likewise, Applicants are **not** obligated under 37 C.F.R. and MPEP to explain and point out to the Examiner as to why claims 22-42 are patentable under 35 U.S.C. §102 and 35 U.S.C. §103, particularly, when no art has been cited or specified by the Examiner, and the Examiner has not provided any explanation as to how each feature of Applicants' claims 22-42 is anticipated under

35 U.S.C. §102 or rendered obvious under 35 U.S.C. §103 by any of the prior art references, allegedly labeled as "X" and "Y" references as discussed in the PCT note.

Again, in rejecting Applicants' claims 22-42 under 35 U.S.C. §102, the Examiner bears the initial burden of establishing a *prima facie* case of anticipation. Only if this burden is met does the burden of coming forward with rebuttal argument or evidence shift to the Applicants. Ex parte Levy, 17 USPQ2d 1461, 1462 (1990) expressly states:

"it is incumbent upon the examiner to identify wherein each and every facet of the claimed invention is disclosed in the applied reference."

In addition, 37 CFR §1.106(b) requires the Examiner, when rejecting Applicants' claims 22-42 for want of novelty or for obviousness, must cite the best references at his command. When a reference is complex or shows or describes inventions other than that claimed by the Applicants, the particular part relied upon must be designated as nearly as practicable. The pertinence of each reference, if not apparent, must be clearly explained and each rejected claim specified.

Moreover, in order to anticipate Applicants' claims 22-42 under 35 U.S.C. §102, the Examiner must demonstrate that a single prior art reference discloses each and every feature of the claimed invention, either explicitly or inherently. See Glaxo Inc. v. Novopharm Ltd., 52 F.3d 1043, 34 USPQ2d 1565, 1567 (Fed. Cir. 1995). The absence from the reference of any claimed element negates anticipation. Kloster Speedsteel AB v. Crucible Inc., 793 F.2d 1565, 230 USPQ2d 81 (Fed. Cir. 1986). Alternatively, under 35 U.S.C. §103, the Examiner must also

demonstrate that the prior art reference (or references when combined) must teach or suggest all the claim limitations, and that there is suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to modify the reference or to combine reference teachings in order to arrive the subject matter of Applicants' claims 22-42.

In the present situation, the Examiner has **not** explained how any of the "X" and "Y" references listed in the PCT sheet, including allegedly: (1) JP 1-109249, A (Kurt Sauerwein); (2) JP 63-225153, A (Omron Tateishi Electronics Co.); (3) JP 5-107202, A (Hitachi, Ltd.); (4) JP 8-2601, Y2 (Meidensha Corp.); (5) JP 10-300688, A (Fujimori Kogyo Co., Ltd); (6) JP 6-118062, A (Toshiba Corp.); and (7) JP 4-12258, A (Marktec Corp.), teaches each and every elements or at least renders those elements as defined in Applicants' claims 22-42 unpatentable. As a result, the Examiner has failed to meet his initial burden of production. In view of this omission alone, all outstanding objections/rejections of Applicants' claims 22-42 should be withdrawn.

Nevertheless, in an effort to assist the Examiner to appreciate Applicants' disclosed invention and the subject matter of Applicants' claims 22-42, Applicants have taken the liberty to amend claims 22-28, 30-33 and 35-41 to further define Applicants' disclosed invention for purposes of clarity and brevity that are unrelated to patentability and prior art rejections. In addition, explanations as to the nature of Applicants' disclosed invention, including how each of Applicants' claims 22-42 are patentably distinguishable over the most relevant prior art references that are labeled as "X" and "Y" references listed in the PCT sheet, are provided herein below.

First of all, Applicants' disclosure invention is directed to different aspects of a deficiency inspection apparatus as shown in FIG. 2, including, for example, a specimen 1, an image memory 4, a host computer 5, a color display 6, a data memory device 7, a power supply 8, a color camera 21, a polarization filter 22a, an ultraviolet filter 22b, a polarization filter plate 23, a white illuminating lamp 24a, an ultraviolet illuminating lamp 24b and cables 25a-25b. FIG. 5 is a flowchart illustrating an automatic inspection technique in a penetrant inspection according to an embodiment of the present invention. FIG. 7 shows a structure for camera calibration to perform the camera calibration process shown in FIG. 8. FIG. 15 is a flowchart illustrating an image processing algorithm in a magnetic particle inspection according to another embodiment of the present invention. Other drawings, including FIGs. 3-4, 6, 9-14 and 16-22 show the many other aspects of Applicants' disclosed invention.

However, the two major aspects of Applicants' disclosed invention relate to the magnetic particle inspection and the penetrant inspection. The magnetic particle inspection is basically characterized by (a) picking up an image of a surface of the specimen by using a color camera through a filter which cut off reflected light of the irradiated ultraviolet light; (b) detecting (extracting) a deficiency candidate on the surface by using a green (G) signal component of an image acquired by said color camera; (c) displaying an image of a detected deficiency candidate on a screen; and (d) storing the displayed image in a memory so as to be able to re-check the deficiency by redisplaying the stored image on the screen. Next, the penetrant inspection is basically characterized by (a') picking up an image of a surface illuminated with polarized light by a color camera via a polarization filter, wherein

such a camera is calibrated by using camera calibration color chart for inspection;
(b') converting RGB data of the picked up image to chromaticity (x,y) and luminance Y; (b'') detecting (extracting) a deficiency candidate on the surface by using information of the chromaticity (x,y) and luminance Y converted from the RGB data of said image; (c) displaying an image of a detected deficiency candidate on a screen; and (d) storing the displayed image in a memory so as to be able to re-check the deficiency.

Claims 22-42 have been amended to emphasize in various scope of coverage these two aspects of Applicants' disclosed invention. For example:

Claims 22 and 33, as amended, define a deficiency inspection method based on a magnetic-particle inspection scheme, comprising the step of picking up a color image of fluorescent magnetic powder of the specimen by using a color camera through a filter which cut off reflected light of irradiated ultraviolet light (P9 lines 11~P10 lines 2 of the specification); and the step of detecting a deficiency candidate by using a green (G) signal component of said image acquired by said color camera (P18 lines 24~P16 lines 9 of the specification)."

None of the cited "X" and "Y" references listed in the PCT sheet, including allegedly: (1) JP 1-109249, A (Kurt Sauerwein); (2) JP 63-225153, A (Omron Tateishi Electronics Co.); (3) JP 5-107202, A (Hitachi, Ltd.); (4) JP 8-2601, Y2 (Meidensha Corp.); (5) JP 10-300688, A (Fujimori Kogyo Co., Ltd); (6) JP 6-118062, A (Toshiba Corp.); and (7) JP 4-12258, A (Marktec Corp.), discloses or suggests the features of Applicants' base claims 22 and 33.

Perhaps, the most relevant reference is reference #2 (JP 63-225153). However, such a reference only discloses that,

"Moreover, if Parts 21a and 21b are not correctly mounted as shown in Fig. 4 (A), among the image signal of the line a outputted from this TV camera 37, the R signal is set to a high level only with adhesive portion 28 as shown in Fig. 4 (B), and as shown in Fig. 4 (C), the G signal serves as a high level only with the portion except adhesive portion 28. Moreover, B signal in the image signal serves as a low level on the whole, as shown in Fig. 4 (D)."

Moreover, such a reference only relates to a substrate inspection method for inspecting the mount state of an electric part wherein not only a pre-flux emitting fluorescence having a wavelength λ_1 but also an adhesive emitting fluorescence having a wavelength λ_2 are applied to a substrate to mount the electric part thereto and the mount state is judged by discriminating the color of the image pickup result picked up the image of the substrate.

Reference #1 (JP 1-109249, A: USP No. 5,047,851) does **not** disclose the step of "detecting a deficiency candidate by using a green (G) signal component of said image acquired by said color camera" as defined by Applicants' base claims 22 and 33.

Similarly, claims 24 and 37, as amended, define a "deficiency inspection method based on a magnetic-particle inspection scheme, comprising the step of picking up a fluorescent image of fluorescent magnetic powder of the specimen by using a color camera through a filter which cut off reflected light of irradiated ultraviolet light (P9 lines 11 – P10 lines 2 of the specification); and the step of displaying an image acquired by said color camera on a screen in nearly the same state as an image acquired by visually observing said surface irradiated with said ultraviolet rays (P10 lines 14-lines 24 of the specification)."

Again, reference #1 (JP 1-109249, A: USP No. 5,047,851) only discloses that "by means of the optical filter 5 the background picture can be largely masked out,

so that essentially only fluorescent light reaches the pick-up part of the color television camera 3 through the lens 4."

Reference #3 (JP 5-107202, A Hitachi, Ltd.) only discloses a magnetic particle examination equipment for magnetic testing. Enclosed for the Examiner's convenience is an English translation of the Japanese application.

Reference #4 (JP 8-2601, Y2, Meidensha Corp.) only discloses a visual inspection apparatus of wire harness that has nothing to do with the subject matter of Applicants' base claims 24 and 37.

Claim 25, as amended, defines "a deficiency inspection method based on a magnetic particle inspection scheme, comprising the step of picking up a fluorescent image of fluorescent magnetic powder of the specimen by using a color camera through a filter which cut off reflected light of irradiated ultraviolet light (P9 lines 11 – P10 lines 2 of the specification); the step of extracting deficiency candidates from an image acquired by said color camera; and the step of displaying images of said extracted deficiency candidates on a screen (Fig. 18 - Fig. 19).".

Again, none of the cited "X" and "Y" references listed in the PCT sheet, including allegedly: (1) JP 1-109249, A (Kurt Sauerwein); (2) JP 63-225153, A (Omron Tateishi Electronics Co.); (3) JP 5-107202, A (Hitachi, Ltd.); (4) JP 8-2601, Y2 (Meidensha Corp.); (5) JP 10-300688, A (Fujimori Kogyo Co., Ltd); (6) JP 6-118062, A (Toshiba Corp.); and (7) JP 4-12258, A (Marktec Corp.), discloses or suggests the features of Applicants' base claim 25, including "the step of extracting deficiency candidates from an image acquired by said color camera and the step of displaying images of said extracted deficiency candidates on a screen."

Claim 26, as amended, defines "a deficiency inspection method based on a penetrant inspection scheme, comprising the step of picking up an image of a surface of a specimen by using a color camera; the step of converting RGB data of the picked-up image to chromaticity and luminance {based on expression of relations (equation (1) and equation (2)) between the RGB values and the chromaticity value and the luminance value which have been measured by a colorimeter beforehand} (P14 lines 23 - P15 line 4 of the specification); and the step of detecting a deficiency candidate on said surface by using information of said chromaticity and luminance converted from said RGB data of said converting step (P16 lines 11 - P18 lines 21).".

Again, none of the cited "X" and "Y" references listed in the PCT sheet, including allegedly: (1) JP 1-109249, A (Kurt Sauerwein); (2) JP 63-225153, A (Omron Tateishi Electronics Co.); (3) JP 5-107202, A (Hitachi, Ltd.); (4) JP 8-2601, Y2 (Meidensha Corp.); (5) JP 10-300688, A (Fujimori Kogyo Co., Ltd); (6) JP 6-118062, A (Toshiba Corp.); and (7) JP 4-12258, A (Marktec Corp.), discloses or suggests the features of Applicants' base claim 26.

Claim 27, as amended, defines "a deficiency inspection method based on a magnetic-particle inspection scheme, comprising: the step of picking up an image of said surface illuminated with said polarized light by a color camera via a polarization filter (P9 lines 11 - lines 24), said color camera being calibrated by using camera calibration color chart for inspection (P12 lines 25 - P14 lines 22; Fig. 7 and Fig. 8); the step of extracting deficiency candidates from said image acquired by said color camera; and the step of displaying images of said extracted deficiency candidates on a screen (P20 lines 8 - P21 lines 8)."

Again, none of the cited "X" and "Y" references listed in the PCT sheet, including allegedly: (1) JP 1-109249, A (Kurt Sauerwein); (2) JP 63-225153, A (Omron Tateishi Electronics Co.); (3) JP 5-107202, A (Hitachi, Ltd.); (4) JP 8-2601, Y2 (Meidensha Corp.); (5) JP 10-300688, A (Fujimori Kogyo Co., Ltd); (6) JP 6-118062, A (Toshiba Corp.); and (7) JP 4-12258, A (Marktec Corp.), discloses or suggests the features of Applicants' base claim 27.

Claims 28 and 38, as amended, define "a deficiency inspection method for magnetic-particle-inspection scheme or penetrant-inspection, comprising the step of picking up an image of a surface of a specimen by a color camera with positional information of a visual field of said color camera which is calibrated by using camera calibration color chart for inspection (P12 lines 25 - P14 lines 22) ; the step of detecting deficiency candidates in said surface by processing (penetrant processing) a color signal of said image acquired by said color camera; and the step of displaying images of said detected deficiency candidates on a screen together with said positional of said visual field (P20 lines 8 - P21 lines 8):".

Claim 31, as amended, defines "a deficiency inspection method for magnetic-particle-inspection scheme or penetrant-inspection, comprising the step of displaying images of said extracted deficiency candidates on a screen; and the step of distinguishing a pseudo deficiency among said deficiency candidates displayed on said screen." (see FIG. 17)

Claim 32, as amended, defines "a deficiency inspection method comprising the step of displaying images of said deficiency candidates on a screen; and the step of storing said displayed image of said deficiency candidates with information of feature characteristics of said deficiency candidate in a memory."

Claim 35, as amended, defines "a deficiency inspection apparatus, comprising: image pickup means for picking up an image of said surface by a color camera which is calibrated by using camera calibration color chart for inspection (P12 lines 25-P14 lines 22; Fig. 7 and Fig. 8); and display means for displaying image of said deficiency candidates detected by said magnetic-particle-inspection-originated deficiency-candidate extraction means or said penetrant-inspection-originated deficiency candidate extraction means."

Specifically, on P12 lines 25 - P13 lines 11 of Applicants' disclosure, it is described that "color calibration is executed beforehand using a camera calibration color card 71 as shown in Fig. 7 in order to perform high-precision conversion of RGB data to chromaticities (x,y) and luminance (Y). The flow of that process is shown in Fig. 8. The camera calibration color card 71 has three or more colors painted. The colors are picked up by the color video camera 21 (81), and the RGB values of the individual colors are computed (82). The chromaticities (x,y) and luminance (Y) are measured (83) by a colorimeter 72. The relationship between the RGB values and (x,y) (Y) values is expressed by equation (1) and (2)."

Claim 36, as amended, defines "a deficiency inspection apparatus for magnetic-particle-inspection, comprising: a deficiency-candidate detector which detects deficiency candidates on said surface from said image of said surface picked up by said camera by using a green (G) signal component of said image; and display unit which displays information of said images of said deficiency candidates stored in said storage section on a screen."

Claim 39, as amended, defines "a deficiency inspection apparatus, comprising: illuminating means for illuminating light on a surface of a specimen to

which a penetrant-inspection treatment is applied; image pickup means for picking up an image of said surface illuminated by said illuminating means by a color camera; converter means for converting RGB data of the image picked-up by said image pickup means to chromaticity and luminance [based on expression of relations (equation #1 and equation #2), see page 14, line 23 extending to page 15, line 4 of Applicants' disclosure]; deficiency-candidate detecting means for detecting deficiency candidates on said surface from said image picked-up by said color camera of said image pickup means [see page 16, line 11 extending to page 18, line 21 of Applicants' disclosure]; display means for displaying images of said deficiency candidates detected by said deficiency-candidate detecting means; and memory means for storing displayed images with data of chromaticity and luminance obtained by said converter means [see page 16, line 11 extending to page 18, line 21 of Applicants' disclosure]."

Lastly, claim 40, as amended, defines "a deficiency inspection apparatus, comprising: illumination means for illuminating a surface of a specimen to which a penetrant is temporarily applied with white light; image pickup means for picking up an image of said surface by a color camera which is calibrated by using camera calibration color chart for inspection camera; magnetic-particle-inspection-originated deficiency-candidate detecting means for detecting magnetic-particle-inspection originated deficiency candidates on said surface from a green (G) signal component of said image of said surface picked up by said image pickup means; penetrant-inspection-originated deficiency-candidate detecting means for detecting penetrant-inspection-originated deficiency candidates on said surface from said image picked up by said image pickup means; and display means for displaying images of said

deficiency candidates detected by said magnetic-particle-inspection-originated deficiency-candidate detecting means or said penetrant-inspection-originated deficiency-candidate detecting means.”

Again, none of the cited “X” and “Y” references listed in the PCT sheet, including allegedly: (1) JP 1-109249, A (Kurt Sauerwein); (2) JP 63-225153, A (Omron Tateishi Electronics Co.); (3) JP 5-107202, A (Hitachi, Ltd.); (4) JP 8-2601, Y2 (Meidensha Corp.); (5) JP 10-300688, A (Fujimori Kogyo Co., Ltd); (6) JP 6-118062, A (Toshiba Corp.); and (7) JP 4-12258, A (Marktec Corp.), discloses or suggests the features of Applicants’ base claims 28-40.

In view of the foregoing amendments, arguments and remarks, all claims are deemed to be allowable and this application is believed to be in condition to be passed to issue. Should any questions remain unresolved, the Examiner is requested to telephone Applicants’ attorney at the Washington DC area office at (703) 312-6600.

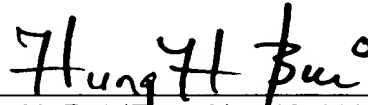
Appl. No. 09/889,920
Amendment dated August 25, 2003
Reply to Office Action of April 24, 2003

To the extent necessary, Applicants petition for an extension of time under 37 CFR §1.136. Please charge any shortage of fees due in connection with the filing of this paper, including extension of time fees, to the Deposit Account of Antonelli, Terry, Stout & Kraus, No. 01-2135 (Application No. 520.40381X00), and please credit any excess fees to said deposit account.

Respectfully submitted,

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CLAIMS

[Claim(s)]

[Claim 1] A magnetic particle examination equipment which detects the defect of a material-lust layer by viewing the pattern of the magnetic powder formed in leakage magnetic field which generates in neighborhood of the material defect with the application of a magnetic powder when material is magnetized, comprising:

a magnetic-powder liquid spraying equipment, an image pick-up equipment for examination side observation, and an illumination system which are mounted in one united body on a magnetizing equipment providing a traveling apparatus such as a wheel which can travel freely,

wherein a hole being opened in an iron core which constitutes the magnetic path of a magnetizing equipment, the hole in which is embedded a television camera for observing center section of examination side.

[Claim 2] A magnetic particle examination equipment according to claim 1, wherein further provides a filter which penetrates only the fluorescence of specific wavelength alternatively in the front face of image pick-up equipment in order to prevent lighting light carrying out incidence to the image pick-up equipment for examination side observation directly or indirectly.

[Claim 3] A magnetic particle examination equipment according to claim 1, wherein further provides an opening switchgear in order that the splash might prevent adhering to opening of examination side image pick-up equipment when sprinkling a suspension.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]

This invention relates to the equipment of magnetic testing which is the one method of the nondestructive test performed in order to discover a material flaw.

[0002]

[Description of the Prior Art]

From the former, the magnetic particle examination called yoke method is applied to the weld zone of the large-sized steel structure, and inspection of the material defect of

cast-forged steel products. This method is a method of detecting a defect from the magnetic particle pattern which was pouring out the suspension which suspended the ferromagnetic powder 302 in water etc., and adhered to the defective part 510, magnetizing the surface section of material 500 with an electromagnet, as shown in Fig. 1. The method of a yoke method is shown in Fig. 2. Fig. 2(a) excites the electromagnet which consists of an iron core 130 and a coil 131 with a power supply 110, magnetizes a test coupon 500, makes a magnetic powder 302 stick to the stray magnetic field 121 generated in a defective part 510, and detects a defect. By changing the phase of the magnetic field of each magnetic pole using 2 sets and four magnetic poles 132, Fig. 2(b) makes the rotating magnetic field 123 as shown in Fig. 2(c), and detects the directivity defect of all the directions simultaneously. Although the fluorescent-magnetic-powder crack detection which observes the fluorescence generated when ultraviolet rays are irradiated that the magnetic powder which applied fluorescent paint is used is adopted in many cases by this method in order to make detection of a defect easy, visible-magnetic-powder crack detection observed by the visible ray is also performed.

[0003]

In any case, although the procedure of magnetization of material, suspension spraying, and observation is required and a magnetizing equipment, a suspension sprinkler, and lighting fitting are used corresponding to each procedure, each has dissociated, these equipments have been independent and it has become the method which an inspector operates manually and applies according to test procedure. Similarly, an inspector is the method which carries out by viewing directly and distinguishes the existence of defective in JIKESHON, and observation has become the factor which checks automation greatly also including the piped mode operation of the above-mentioned test procedure.

[0004]

Moreover, in order to record the configuration of a defect, there was a fault which cannot but take a photograph of, or cannot but imprint to an adhesive tape, and is said that record-ability is scarce.

[0005]

[Problem(s) to be Solved by the Invention]

Although the procedure by an inspector's manual operation was performing, all the above-mentioned conventional technology is not taken into consideration about automation and high efficiency by improvement of record-ability, but repeats the same inspection each time and has the big problem which becomes useless in the case which carries out to inspection by the customer, and the presence inspection by the

[0012]

The floodlight 250 of Fig. 3 irradiates ultraviolet rays 252. fluorescence is generated from a fluorescent magnetic powder, and although the work which makes a defect detect with a camera 200 is carried out, some ultraviolet rays 252 reflected in respect of [502] the examination reach the direct camera 200. Since intensity is strong, this light is wearing monitor display with the light of a purplish red color, is not visible and carries out other images. Although the fluorescence which a magnetic powder emits in the front face of a camera 200 was made to penetrate in this invention as shown in Fig. 4(a) in order to prevent this un-arranging, ultraviolet rays formed the optical filter 231 to cut. This intercepted detrimental reflective ultraviolet rays.

[0013]

Although the suspension which made the examination side suspend a magnetic powder was sprinkled in the magnetic particle examination, the shutter 232 was formed in order to prevent that the droplet of the suspension which dispersed in respect of the examination then adheres to the lens of a camera 200. A shutter 232 is closing when drive with an actuator 234, and it opens and closes, becoming open when observing an examination side, and sprinkling a suspension, and it has protected the lens of a camera.

[0014]

[Effect of the Invention]

According to this invention, prevention of three troubles acting as [when automating a magnetic particle examination] the obstacle, i.e., the position of a camera and a visual field, and ultraviolet rays, and the cure against a droplet of a suspension are solved, and full automation of a magnetic particle examination is attained. Consequently, individual differences and the human error in a magnetic particle examination are eliminated, and reliability improves, and also the improvement in efficiency by an improvement of record-ability or automation of an examination process is attained.

[Brief Description of the Drawings]

[Fig. 1] Explanatory drawing of the procedure of a magnetic particle examination.

[Fig. 2] Principle explanatory drawing of a magnetic particle examination.

[Fig. 3] The front view (a) of the magnetizing-equipment section, a plan (b), a side elevation (c).

[Fig. 4] A light filter, and the side elevation (a), plan (b) which prepared the camera guard plate.

[Fig. 5] Explanatory drawing of the fault by the attaching position of a camera.

[Fig. 6] Explanatory drawing showing the usefulness of the position of the camera of

this invention.

[Description of Notations]

100 -- magnetizing equipment. 200 -- image pick-up equipment (camera). 231 -- optical filter. 232 -- movable closing plate (shutter). 233 -- bearing. 234 -- actuator. 250 -- ultraviolet-rays floodlight. 251 -- bracket. 502 -- examination side.